

Surface Contamination Monitor and Survey Information Management System

Five facilities at the Nevada Test Site are slated for decontamination and decommissioning in the next seven years. The first facilities to be surveyed for decontamination and decommissioning are in the area where nuclear rocket development took place. The site is in need of a monitor for alpha, beta, and gamma radiation scanning of floors with continuous recording of the data. Currently, the standing technology is multiple hand-held survey instruments using different detectors, hand recording of data, data reduction, and manual mapping of the data results. This method is labor intensive, relatively slow, and subject to a technician's observation.

To address the site's need, the U.S. Department of Energy (DOE) Environmental Management's Office of Science and Technology has partnered with the DOE Nevada Operations Office in an Accelerated Site Technology Deployment project and is providing \$85,000 of funding. The DOE Nevada Operations Office has committed \$165,000 to this Accelerated Site Technology Deployment project. Through this activity, the Nevada Test Site used a Surface Contamination Monitor and Survey Information Management System under a service contract with Shonka Research Associates.

In October 1999, The Surface Contamination Monitor and Survey Information Management System was used at the Test Cell C facility where nuclear rocket reactors were tested. The facility has a large exterior concrete pad and an interior floor space which required surveying. It was then used at Radioactive Maintenance, Assembly, and Disassembly facility in Area 25. Use of the Surface Contamination Monitor and Survey Information Management System for the characterization of concrete floors will expedite surveys and closure while reducing cost and risk. Use of Surface

Contamination Monitor and Survey Information Management System is also expected to be deployed at other Nevada Test Site facilities including the nuclear propulsion rocket research facility.

Technical Need

Surveying and documentation of alpha, beta, and gamma radioactive contamination is an issue in many decontamination projects. Automated surveying systems that record and display data as collected, coupled with post-survey computer processing can enhance reliability and reduce costs.

Using traditional radiation measurement techniques, the facility would be gridded into one-meter squares on both floors and walls and then hand-held meters and "swipes" would be used to measure radiation levels. Subsequently, the data is analyzed and the results transferred onto building drawings. This process is time consuming and allows for a technician's subjective observation and therefore human error during the process.



Test Cell "C" Facility



System Description

The Shonka Position-Sensitive Radiation Monitor System consists of a cart-mounted surface contamination monitor and a survey information management system. The Surface Contamination Monitor consists of a position-sensitive counter that acts as the equivalent of hundreds of individual detectors aligned in a four-foot long detector row. Using a low-cost wheel encoder, the detector scans over the surface in a series of four-foot wide strips.

The Survey Information Management System includes a video camera, an electronic data recorder logger, and a personal computer. The system records both the intensity and location of the radioactivity. The data is automatically downloaded to the on-board personal computer and stores all the information in binary files that can be analyzed by the system for report generation and re-examination. The system removes the technician's subjective observations from the process and produces more accurate reports of the radiological conditions. These reports can be graphical, with color-coded radiological levels overlaid on an area map. This system is also capable of producing two-dimensional and pseudo three-dimensional surface plots of hot spot locations.

Benefits

The Surface Contamination Monitor and Survey Information Management System can correlate three-dimensional images with a real-time video. It can generate survey reports as color-coded three-dimensional graphics or overlay the graphics on drawings or photographs of the site. This gives managers and technicians a more complete understanding of a contaminated area.

This system displays the minimum, maximum, average, and standard deviation of the survey data in live time. Measurements exceeding regulatory levels can be set to appear as either color-coded or in boldface type.

The Surface Contamination Monitor and Survey Information Management System takes 400

measurements per square meter with a minimum detectable activity that is 100 to 200 times greater for detecting hot spots than the baseline technology. This provides a higher confidence level in the completeness and sensitivity of the survey.

The system consistently maintains the proper survey speed and distance between the detector and monitor surface, reducing the variation and uncertainty in the survey data.

The cost and productivity rates of the Surface Contamination Monitor and Survey Information Management System are better than conventional methods. As part of the Hanford C-Reactor Large Scale Demonstration and Deployment Project, the system had productivity rates five times faster for beta/gamma surveys and two times faster for alpha surveys. Cost of the system was 13% to 57% lower than conventional methods. A cost savings of more than \$106,000 is expected.

Deployment of the Surface Contamination Monitor and Survey Information Management System at the Nevada Test Site is planned as follows:

Procurement	June 1999
System Training/Shakedown	September 1999
Initial Deployments (Test Cell C/RMAD)	October 1999
3 rd Deployment (Pluto Facility)	April 2000 <i>tentative</i>

Contact

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